

# Commercial Standard **CS77-56**

SUPERSEDES CS77-51

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## **Enameled Cast-Iron Plumbing Fixtures**

A RECORDED VOLUNTARY STANDARD OF THE TRADE

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**UNITED STATES DEPARTMENT OF COMMERCE**

**Sinclair Weeks, Secretary**



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**Prepared by**

**OFFICE OF TECHNICAL SERVICES**

**Commodity Standards Division**

**In cooperation with**

**NATIONAL BUREAU OF STANDARDS**

# Enameled Cast-Iron Plumbing Fixtures

(Fourth Edition)

[Effective September 15, 1956]

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## 1. PURPOSE

1.1 The purpose of this Commercial Standard is to establish minimum standard specifications for enameled cast-iron plumbing fixtures for the guidance of manufacturers, distributors, and purchasers; to promote better understanding between suppliers and users; and to serve as a basis for fair competition in furnishing enameled cast-iron plumbing fixtures to meet the principal demands of the trade.

## 2. SCOPE

2.1 This Commercial Standard establishes standard nomenclature, definitions, and methods of inspection for enameled cast-iron plumbing fixtures; and includes requirements for material, construction, testing, marking, and labeling. Standard types and sizes and certain standard dimensions and tolerances are given herein for enameled cast-iron bathtubs, lavatories, sinks, laundry trays, and urinals.

## 3. GENERAL REQUIREMENTS

3.1 *Material.*—Enameled cast-iron fixtures shall be of one-piece high-grade cast iron, and the castings shall be strong, sound, true to

form, and free from porosity, cracks, and other defects which may affect the serviceability of the fixtures. The cast iron shall be not less than  $\frac{1}{8}$  in. thick at all points 1 in. or more from any edge. The cast iron shall form a suitable base for the enamel coating.

**3.2 Enameling.**—The enameled surface of each fixture shall be coated with enamel applied by the dry process over a ground coat, and fired at or above a red heat so as to be thoroughly fused to the cast-iron base. The ground coat shall also be applied to surfaces normally in contact with the wall or floor. The enamel shall be glossy, of uniform color, and free from flaws that affect the appearance or may affect the serviceability of the fixtures. Blemishes shall be limited in accordance with the method of inspection specified in paragraph 6.1. The thickness of the enamel, as measured on a flat surface at least 1 in. from any edge, shall be not less than 0.025 in. Unenameled surfaces shall be treated with one coat of filler, ground coat, or paint at the factory.

**3.2.1 Acid-resisting enamel** shall be acid resisting throughout the entire thickness of the enamel coating and shall pass successfully the tests specified in paragraph 7.2.

**3.3 Warpage.**—Warpage of edges set against the wall or floor, and edges of sinks, where set into cabinets or counter tops, shall not exceed  $\frac{1}{16}$  in. per foot when tested according to the method given in paragraph 7.1. Warpage of all other edges shall not exceed  $\frac{3}{32}$  in. per foot when tested according to the same method.

**3.4 Dimensional tolerances.**—Fixtures shall conform to the specified dimensions, within a variation of not more than plus or minus 3 percent, except where maximum and minimum limits are specified, and except as follows: The tolerance on length of apron bathtubs shall be plus or minus  $\frac{1}{2}$  in.

**3.5 Illustrations.**—The illustrations shown herein for various fixtures are for convenience in locating dimensions, and are not intended to indicate designs.

**3.6 Colored ware.**—In addition to white, enameled cast-iron plumbing fixtures are made in several colors. The shade or tint of each color is determined by the individual manufacturer.

**3.7 Standard types and sizes.**—The types and sizes of enameled cast-iron plumbing fixtures under "Detail Requirements" are recognized as standard. Other types and sizes which may be cataloged or otherwise offered for sale are not classed as standard.

## **4. DETAIL REQUIREMENTS**

### **4.1 BATHTUBS**

#### **4.1.1 Apron bathtubs.**

- (a) Right or left corner apron bathtubs, 16 in. high, with outlet on concealed end: 5-ft. length is standard. (Figs. 1, 3, and 6.)
- (b) Right or left recess apron bathtubs, 16 in. high: 4 $\frac{1}{2}$ -, 5-, and 5 $\frac{1}{2}$ -ft. lengths are standard. (Figs. 2, 3, and 6.)
- (c) Recess apron bathtubs, 14 in. high, right or left outlet: 5-ft. length is standard. (Figs. 4, 5, and 6.)

**4.1.2 Bathtub overflows.**—The standard dimensions for overflow outlets to suit 1 $\frac{1}{2}$ -in. drains for recess and corner apron bathtubs are as shown in figures 3 and 5.

4.1.3 *Bathtub outlet dimensions.*—The standard dimensional limits for the finished outlets (after enameling) of enameled cast-iron bathtubs for 1½-in. drain fittings are as set forth in figure 6.

#### 4.2 LAVATORIES.

##### 4.2.1 *Apron lavatories with straight back.*

- (a) Straight-front apron lavatories with straight back: Sizes 19" x 17", 20" x 18", 21" x 18" and 22" x 19" are standard. (Figs. 7 and 8.)
- (b) Round-front apron lavatories with straight back: Sizes 19" x 17" and 26" x 14" (space saver) are standard. (Figs. 9 and 10.)

4.2.2 *Shelf-back lavatories with apron:* Sizes 19" x 17", 21" x 18", 22" x 19", and 24" x 18" are standard. (Fig. 11.)

NOTE.—These lavatories are also made in varying sizes ranging from 13" x 13" to 24" x 18" for wall, leg, and cabinet assembly.

4.2.3 *Shelf-back space-saver lavatories with apron:* Size 19" or 20" x 14" is standard. (Fig. 12)

4.2.4 *Lavatories for cabinet and counter installation:* Size 20" x 18" is standard. (Fig. 13.)

##### 4.2.5 *Apron corner lavatories.*

- (a) Apron corner lavatory with straight back: One size, approximately 16" x 16", is standard. (Fig. 14.)
- (b) Apron corner lavatory with shelf back: One size, approximately 16" x 16", is standard. (Fig. 15.)

##### 4.2.6 *Faucet-hole spacing.*

- (a) Center-set fittings. The standard faucet-hole spacing for center-set fittings is 4 in. center to center, in the top, in the front, in a recessed center panel, or in front of the shelf or the ledge in either shelf-back or ledge-back lavatories, and in lavatories with or without back.
- (b) Separate faucets and combination fittings. The standard faucet-hole spacing for separate faucets and combination fittings is 8 in. center to center, in the top of or in front of the shelf or the ledge in either shelf-back or ledge-back lavatories, and in all staple-pattern lavatories with or without back, except where impracticable and where commercial practice requires 10- or 12-in. spacing.

4.2.7 *Height of backs.*—For all lavatories with straight backs, a height of back of 3½ to 7 in. is standard.

4.2.8 *Lavatory outlet dimensions.*—The standard dimensional limits for outlets of enameled cast-iron lavatories with overflow are as set forth in figure 16. Location of overflow to be optional, at front or rear.

#### 4.3 WASH SINKS.

4.3.1 *Roll-rim free-standing wash sinks on pedestals or standards:* 30-in. width by 8-in. depth by 5-ft. length is standard. (Fig. 17.)

4.3.2 *Wall-hanging wash sinks with back, with or without pedestals:* Sizes 18" x 4', 18" x 5', 18" x 6', and 22" x 8' are standard. (Fig. 18.)

#### 4.4 KITCHEN SINKS.

4.4.1 *Roll-rim kitchen sinks with straight back* (for installation with or without cabinet). Roll-rim kitchen sink with straight back

and single drainboard, drainboard at right or left: Size 42" x 20" is standard. (Fig. 19.)

4.4.2 *Ledge kitchen sinks, 22 in. wide, with back* (designed for installation over cabinets).

(a) Ledge kitchen sink with back and single drainboard, drainboard at right or left: Size 42" x 22" is standard. (Fig. 20.)

(b) Ledge kitchen sink with back and double drainboard: Sizes 54" x 22" and 60" x 22" are standard. (Fig. 21.)

4.4.3 *Ledge kitchen sinks, 23½ to 25 in. wide, with back* (designed for installation over cabinets).

(a) Ledge kitchen sink with back and single drainboard, drainboard at right or left: Size 42" x 23½" to 25" is standard. (Fig. 20.)

(b) Ledge kitchen sink with back and double drainboard: Sizes 54" x 23½" to 25", and 60" x 23½" to 25" are standard. (Fig. 21.)

(c) Ledge kitchen sink, double compartment, with back and without drainboard: Size 38" or 42" x 23½" to 25" is standard. (Fig. 22.)

(d) Ledge kitchen sink, double compartment, with back and double drainboard: Sizes 60" x 23½" to 25", 66" x 23½" to 25", and 72" x 23½" to 25" are standard. (Fig. 23.)

4.4.4 *Flat-rim ledge kitchen sinks.*

(a) Flat-rim ledge kitchen sink without drainboard: Sizes 24" x 21" and 30" x 21" are standard. (Fig. 24.)

(b) Flat-rim ledge kitchen sink, double compartment, without drainboard: Sizes 32" x 20" or 21", and 42" x 20" or 21" are standard. (Fig. 25.)

(c) Flat-rim ledge kitchen sink with single drainboard, drainboard at right or left: Size 42" x 21" is standard. (Fig. 26.)

(d) Flat-rim ledge kitchen sink with double drainboard: Size 54" x 21" is standard. (Fig. 27.)

4.4.5 *One-piece flat-rim kitchen sinks with back (no drainboard)*: Size 30" x 20" is standard. (Fig. 28.)

4.4.6 *Center-outlet flat-rim kitchen sinks*: Sizes 12" x 12", 24" x 16", 24" x 18", 30" x 18", 24" x 20", and 30" x 20", all in one depth, are standard. Depth 6" to 8". (Fig. 29.)

4.4.7 *Flat-rim double-compartment kitchen sinks*: Sizes 32" x 20" and 42" x 20" or 22" are standard. (Fig. 30.)

4.4.8 *Kitchen sink outlet dimensions*.—The standard dimensional limits for outlets of enameled cast-iron kitchen sinks are as set forth in figure 31.

4.4.9 *Standard radius*.—The standard radius of the outside corner of rims of flat-rim and ledge sinks designed for building into counter tops is 1½ in., plus or minus ⅜ in.

#### 4.5 SINK AND LAUNDRY TRAY COMBINATIONS.

4.5.1 *Ledge sink and laundry tray combinations with back, sink at right or left* (designed for installation over cabinets or on legs): Sizes 42" x 24" or 25" and 48" x 24" or 25" are standard. (Fig. 32.)

4.5.2 *Flat-rim sink and laundry tray combinations, reversible*: Size 42" x 20" is standard. (Fig. 33.)

#### 4.6 SERVICE SINKS.

4.6.1 *Roll-rim service sinks with back, on trap standard:* Sizes 22" x 18" and 24" x 20" are standard. (Fig. 34.)

#### 4.7 SUMP SINKS.

4.7.1 *Flat-rim sump sinks:* Sizes 16" x 16" x 10" and 20" x 16" x 10" or 12" are standard. (Fig. 35.)

#### 4.8 LAUNDRY TRAYS.

4.8.1 *Roll-rim laundry trays with back.*

- (a) Roll-rim laundry tray with back, single compartment: Size 27" or 28" x 26" is standard. (Fig. 36.)
- (b) Roll-rim laundry tray with back, double compartment: Size 53" x 26" is standard. (Fig. 37.)

4.8.2. *Ledge flat-rim laundry trays with double compartment:* Size 48" x 25" is standard. (Fig. 38.)

4.8.3. *Flat-rim laundry trays:* Size 24" x 20" or 22" is standard. (Fig. 39.)

4.8.4 *Laundry tray outlet dimensions.*—The standard dimensional limits for outlets of enameled cast-iron laundry trays are as set forth in figure 40.

#### 4.9 URINALS.

4.9.1 *Trough urinals with back:* 3-, 4-, and 6-ft. lengths are standard. (Fig. 41.)

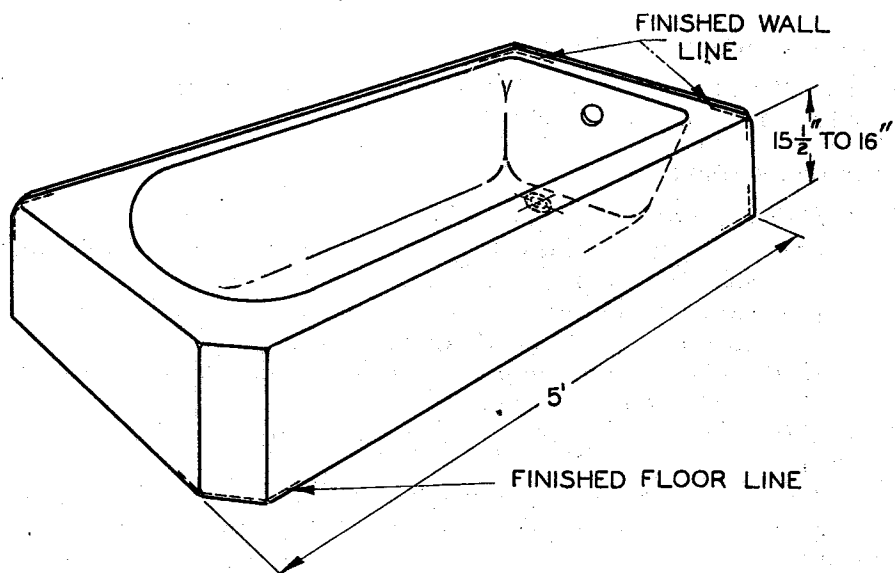


FIGURE 1. *Right or left corner apron bathtubs, 16 in. nominal height, with outlet on concealed end. (Par. 4.1.1 (a) and figs. 3 and 6.)*

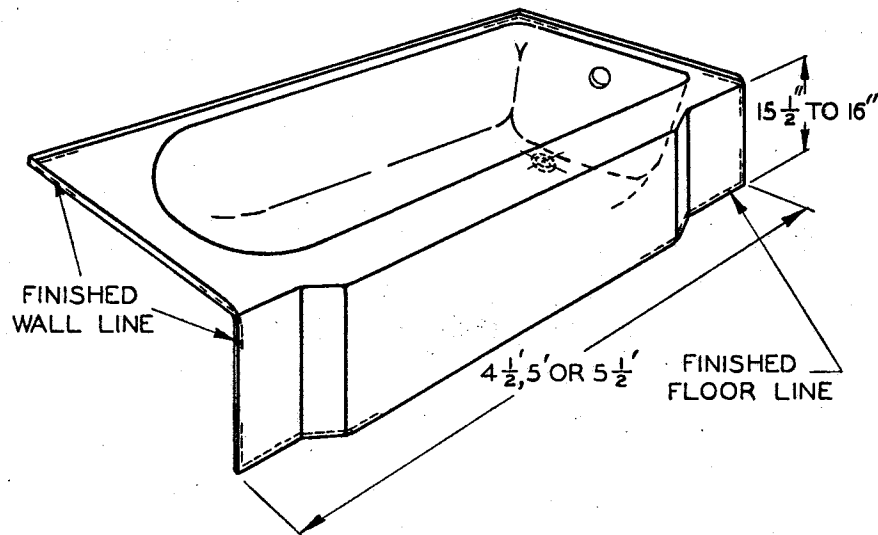


FIGURE 2. *Recess apron bathtubs, 16 in. nominal height, right or left outlet. (Par 4.1.1 (b) and figs. 3 and 6.)*



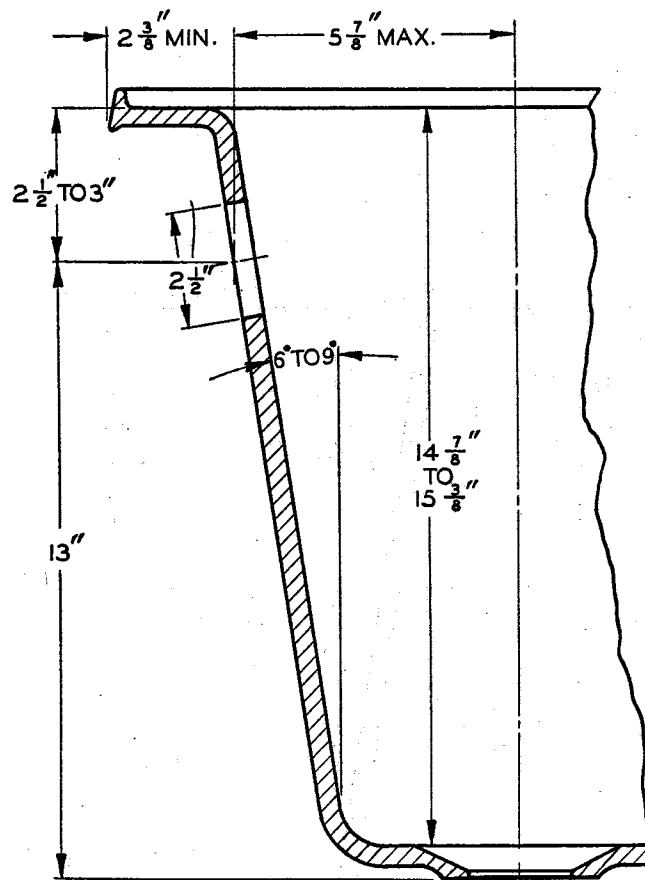


FIGURE 3. *Overflows of recess and corner apron bathtubs, 16 in. high.*  
(Par. 4.1.2.)

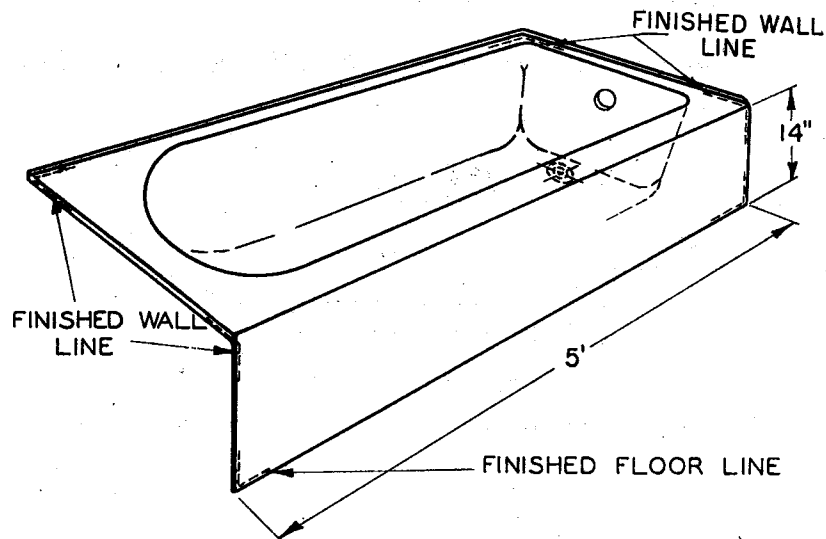


FIGURE 4. *Recess apron bathtubs, 14 in. high, right or left outlet.* (Par. 4.1.1 (c)  
and figs. 5 and 6.)

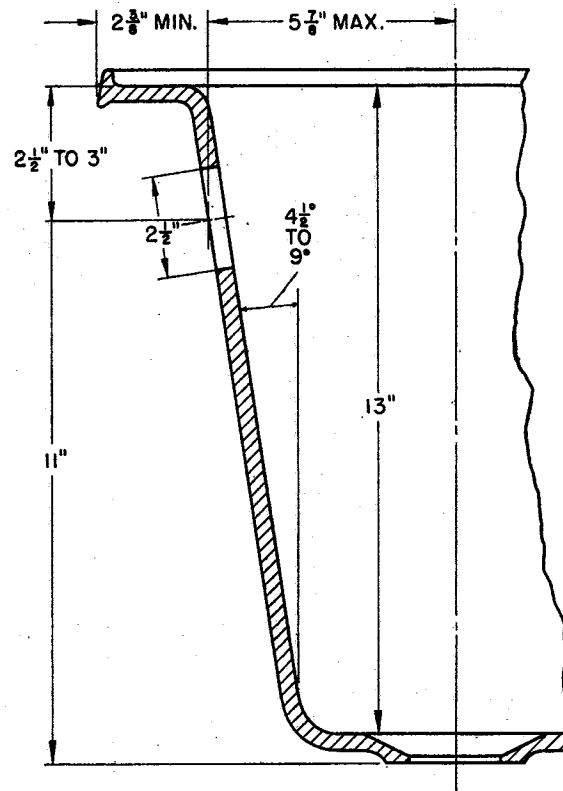


FIGURE 5. *Overflows of recess apron bathtubs, 14 in. high. (Par. 4.1.2.)*

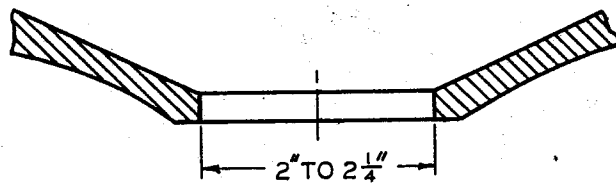
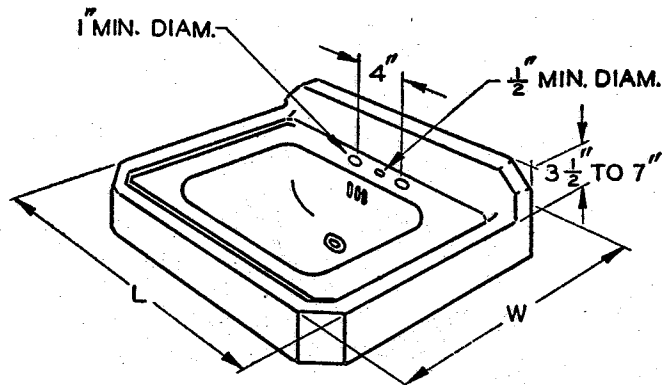


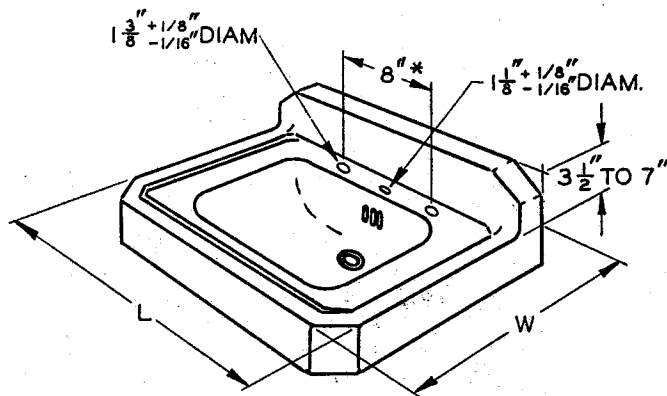
FIGURE 6. *Bathtubs—outlet dimensions for  $1\frac{1}{2}$ -in. drain fitting. (Par. 4.1.3.)*



STANDARD DIMENSIONS

L	W
19"	17"
20"	18"
21"	18"
22"	19"

FIGURE 7. Straight-front apron lavatories with straight back for center-set fittings. (Par. 4.2.1 (a).)



STANDARD DIMENSIONS

L	W
19"	17"
20"	18"
21"	18"
22"	19"

\*MAY BE 10" OR 12"

FIGURE 8. Straight-front apron lavatories with straight back for separate faucets or combination fittings. (Par. 4.2.1 (a).)

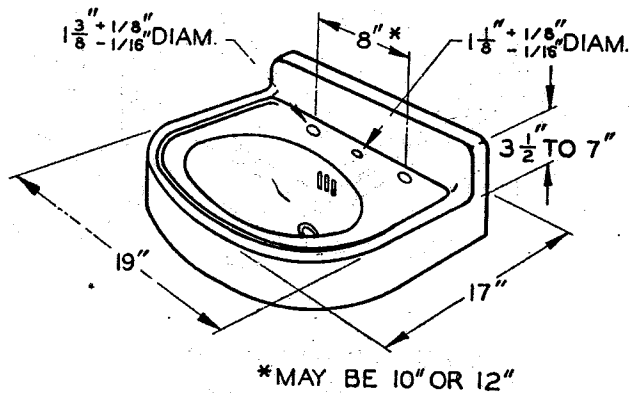


FIGURE 9. Round-front apron lavatories, 19" by 17", with straight back.  
(Par. 4.2.1 (b).)

NOTE.—Cutting for chain stay, when needed, may be in back or slab.

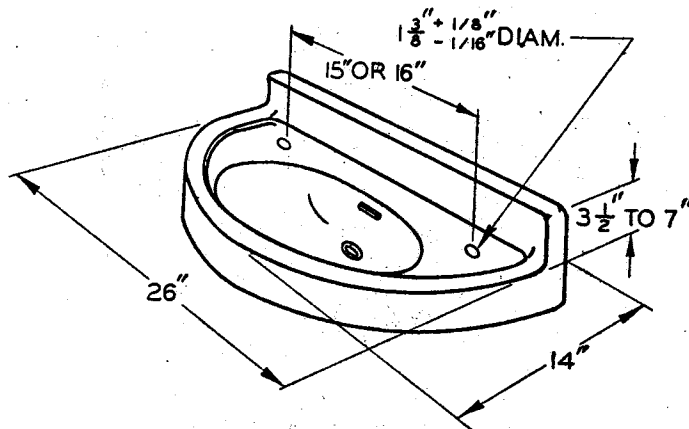


FIGURE 10. Round-front apron lavatories, 26" by 14", with straight-back.  
(Par. 4.2.1 (b).)

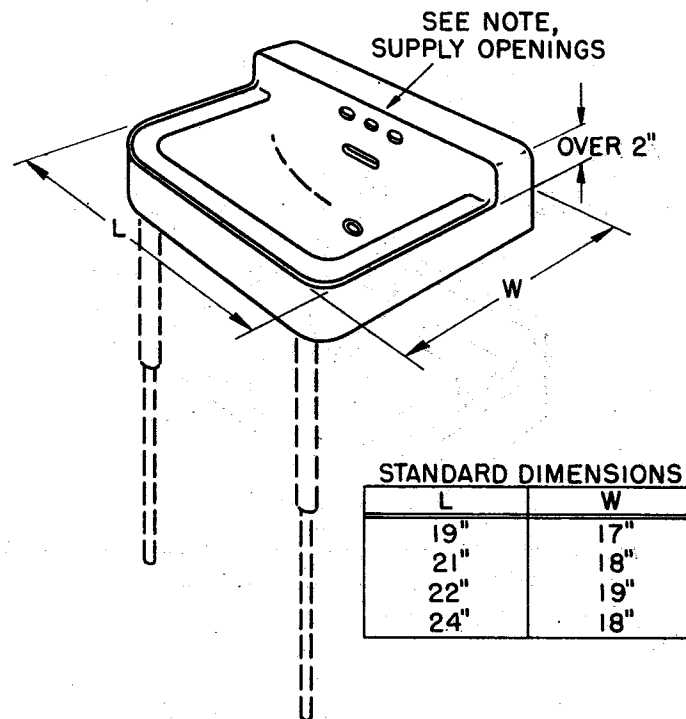


FIGURE 11. *Shelf-back lavatories with apron. (Par. 4.2.2.)*

NOTE.—Supply openings may be in the top of or in the front of the shelf or in an inclined panel in front of the shelf. These lavatories are also made in varying sizes ranging from 13" x 13" to 24" x 18" for wall, leg, and cabinet assembly.

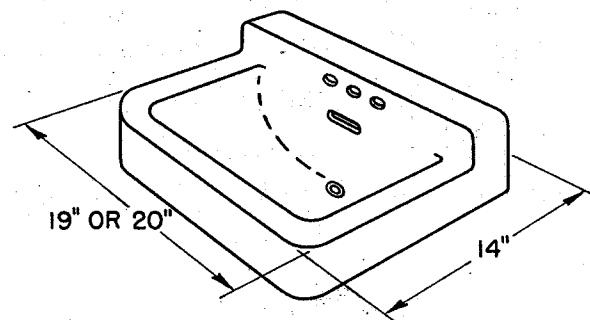


FIGURE 12. *Shelf-back space-saver lavatories with apron. (Par. 4.2.3.)*

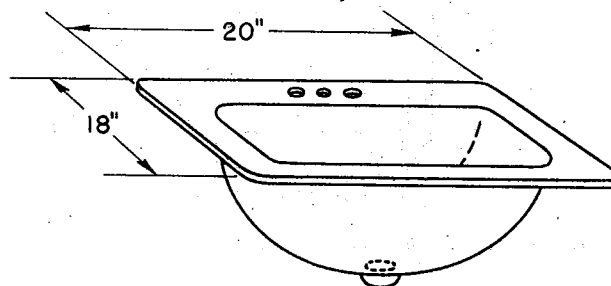


FIGURE 13. *Lavatories for cabinet and counter installation. (Par. 4.2.4.)*

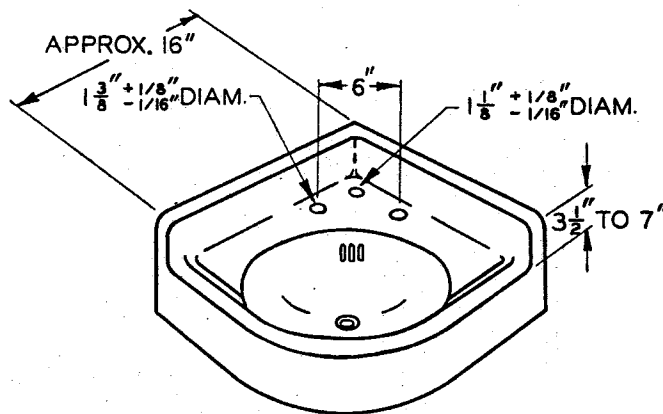


FIGURE 14. *Apron corner lavatories with straight back. (Par. 4.2.5 (a).)*  
 NOTE.—Cutting for chain stay, when needed, may be in back or slab.

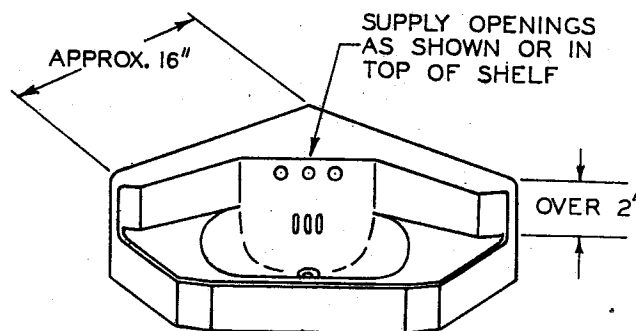


FIGURE 15. *Apron corner lavatories with shelf back. (Par. 4.2.5 (b).)*

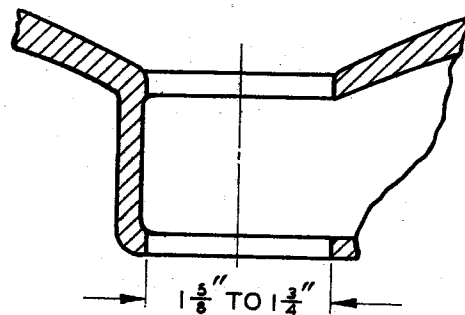


FIGURE 16. *Lavatories with overflow—outlet dimensions. (Par. 4.2.8.)*

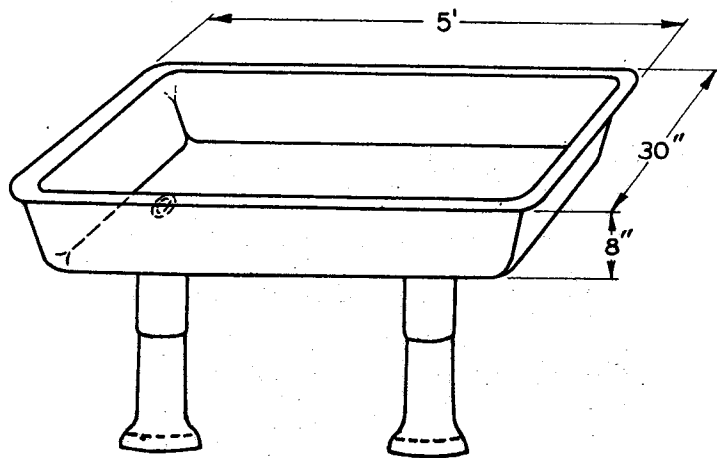
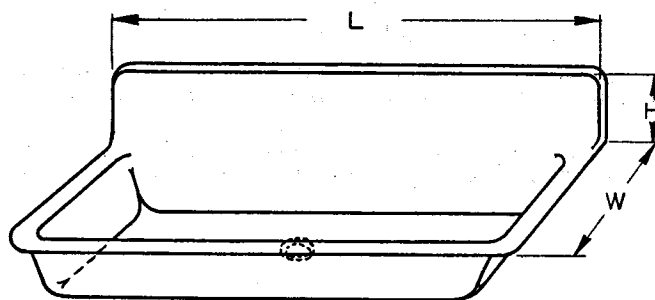


FIGURE 17. Roll-rim free-standing wash sinks on pedestals or standards.  
(Par. 4.3.1.)



STANDARD DIMENSIONS

L	W	H
4'	18"	8"
5'	18"	8"
6'	18"	8"
8'	22"	10"

FIGURE 18. Wall-hanging wash sinks with back, with or without pedestals.  
(Par. 4.3.2.)

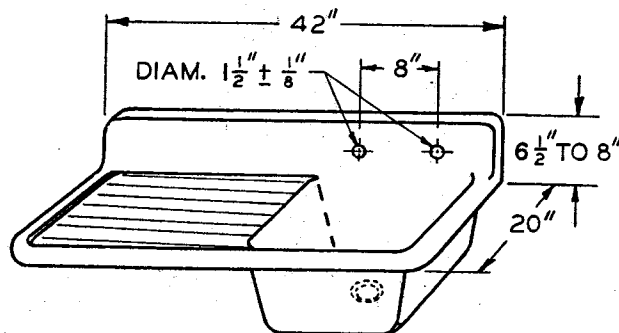


FIGURE 19. Roll-rim kitchen sinks with straight back and single drainboard,  
drainboard at right or left. (Par. 4.4.1.)

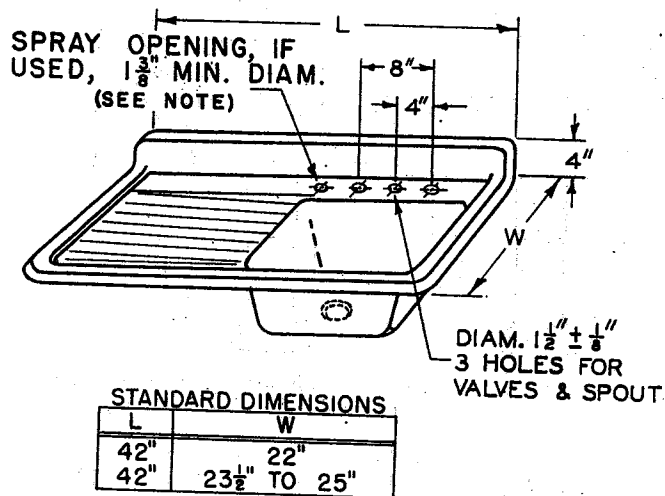


FIGURE 20. Ledge kitchen sinks with back and single drainboard, drainboard at right or left (designed for installation over cabinets). (Pars. 4.4.2 (a) and 4.4.3 (a).)

NOTE.—The location of spray opening is optional, in accordance with manufacturer's usual practice. Supply opening may be in an inclined panel above the ledge.

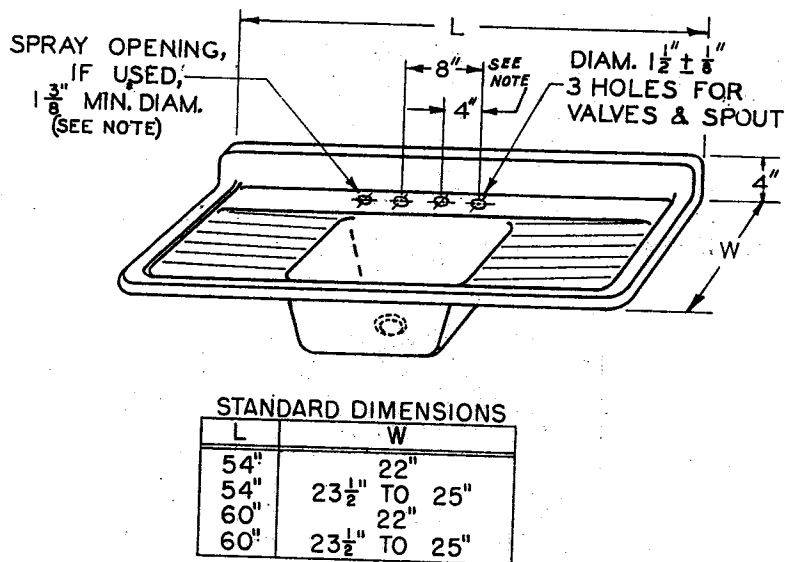


FIGURE 21. Ledge kitchen sinks with back and double drainboard (designed for installation over cabinets). (Pars. 4.4.2 (b) and 4.4.3 (b).)

NOTE.—The location of spray opening is optional, in accordance with manufacturer's usual practice. Supply opening may be in an inclined panel above the ledge and may be 4 $\frac{1}{2}$  in. between centers.



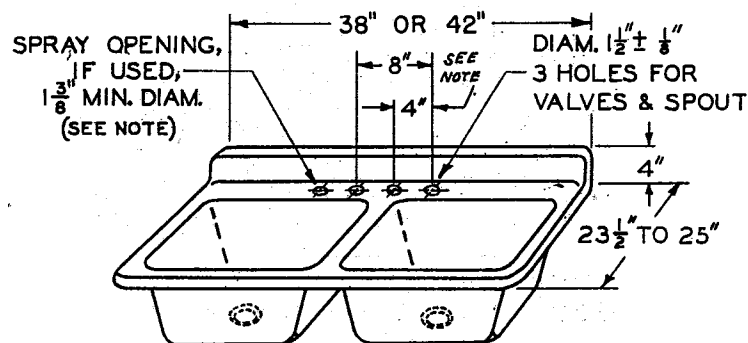
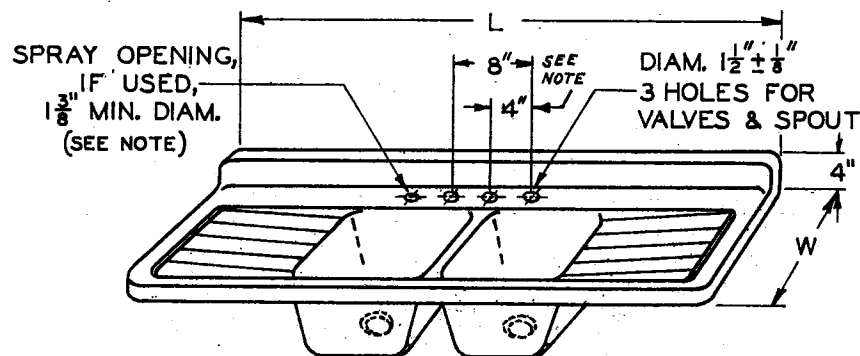


FIGURE 22. *Ledge kitchen sinks, double compartment, with back (designed for installation over cabinets). (Par. 4.4.3 (c).)*

NOTE.—The location of spray opening is optional, in accordance with manufacturer's usual practice. Supply openings may be in an inclined panel above the ledge and may be 4 1/2 in. between centers.

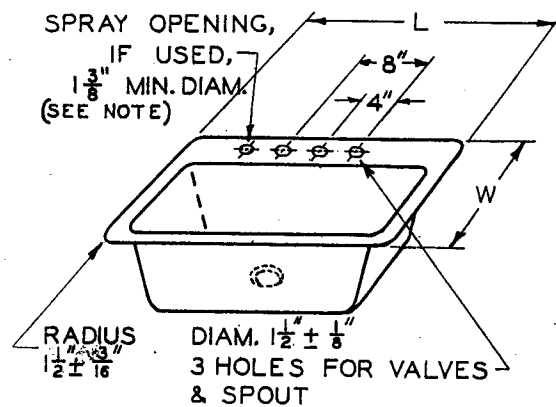


STANDARD DIMENSIONS

L	W
60"	23 1/2" TO 25"
66"	23 1/2" TO 25"
72"	23 1/2" TO 25"

FIGURE 23. *Ledge kitchen sinks, double compartment, with back and double drainboard (designed for installation over cabinets). (Par. 4.4.3 (d).)*

NOTE.—The location of spray opening is optional, in accordance with manufacturer's usual practice. Supply openings may be in an inclined panel above the ledge and may be 4 1/2 in. between centers.

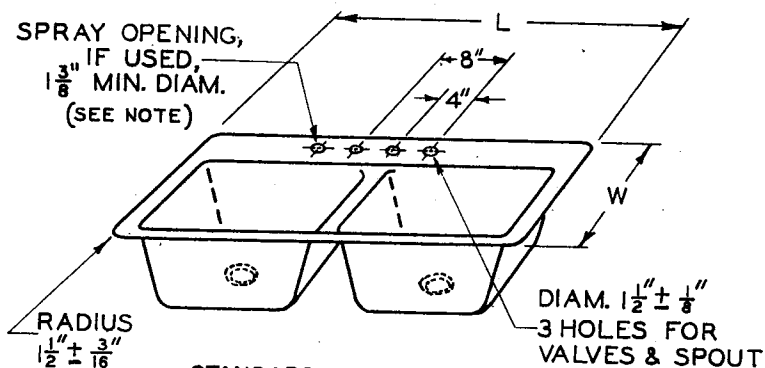


STANDARD DIMENSIONS

L	W
24"	21"
30"	21"

FIGURE 24. Flat-rim ledge kitchen sinks. (Par. 4.4.4 (a).)

NOTE.—The location of spray opening is optional, in accordance with manufacturer's usual practice.



STANDARD DIMENSIONS

L	W
32"	20" OR 21"
42"	20" OR 21"

FIGURE 25. Flat-rim ledge kitchen sinks, double compartment. (Par. 4.4.4 (b).)

NOTE.—The location of spray opening is optional, in accordance with manufacturer's usual practice.

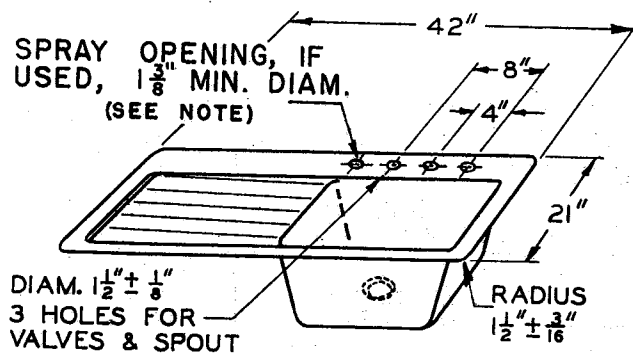


FIGURE 26. Flat-rim ledge kitchen sinks with single drainboard, drainboard at right or left. (Par. 4.4.4 (c).)

NOTE.—The location of spray opening is optional, in accordance with manufacturer's usual practice.

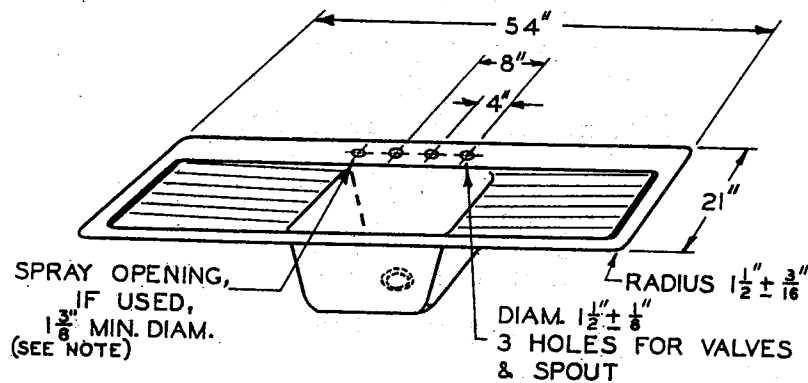


FIGURE 27. Flat-rim ledge kitchen sinks with double drainboard. (Par. 4.4.4 (d).)

NOTE.—The location of spray opening is optional, in accordance with manufacturer's usual practice.

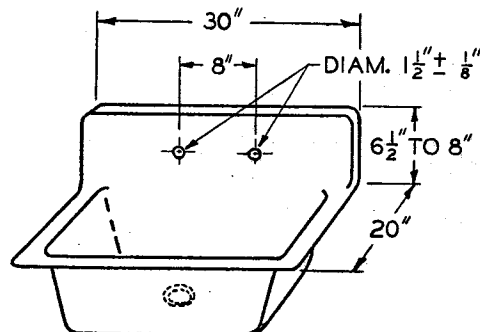


FIGURE 28. One-piece flat-rim kitchen sinks with back. (Par. 4.4.5.)

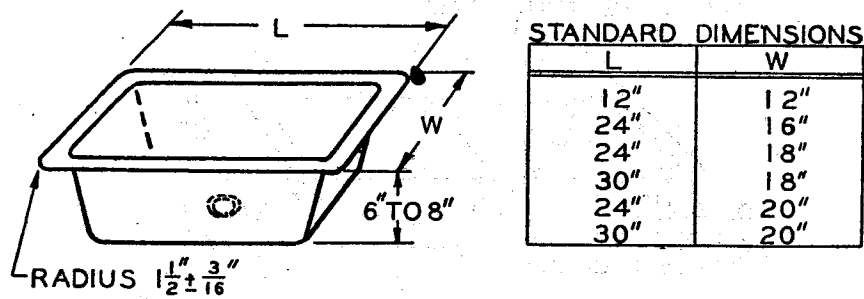


FIGURE 29. Center-outlet flat-rim kitchen sinks. (Par. 4.4.6.)

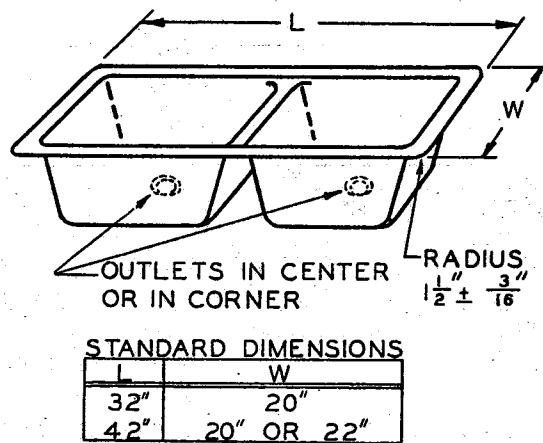


FIGURE 30. Flat-rim double-compartment kitchen sinks. (Par. 4.4.7.)

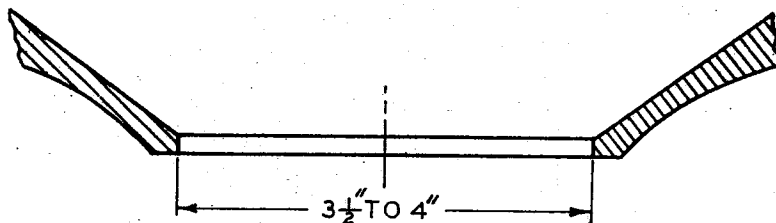
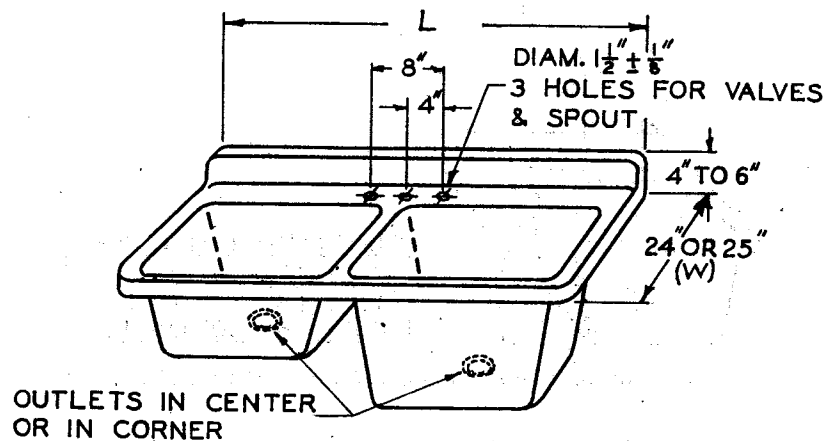


FIGURE 31. Kitchen sink outlet dimensions. (Par. 4.4.8.)



STANDARD DIMENSIONS

L	W
42"	24" OR 25"
48"	24" OR 25"

FIGURE 32. Ledge sink and laundry tray combinations with back, sink at right or left (designed for installation over cabinets or on legs). (Par. 4.5.1.)

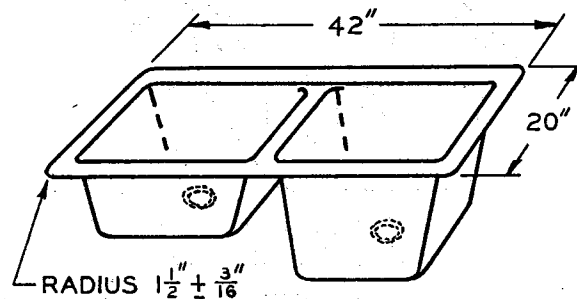


FIGURE 33. Flat-rim sink and laundry tray combinations, reversible. (Par. 4.5.2.)

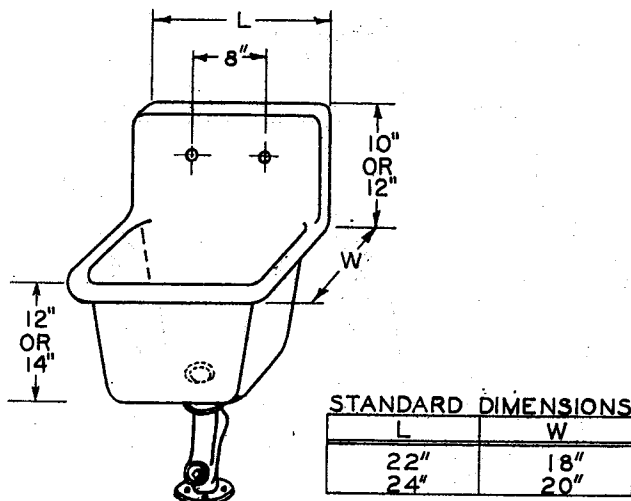


FIGURE 34. Roll-rim service sinks with back, on trap standard. (Par. 4.6.1.)

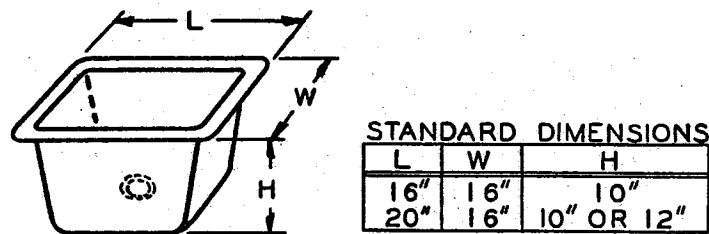


FIGURE 35. Flat-rim sump sinks. (Par. 4.7.1.)

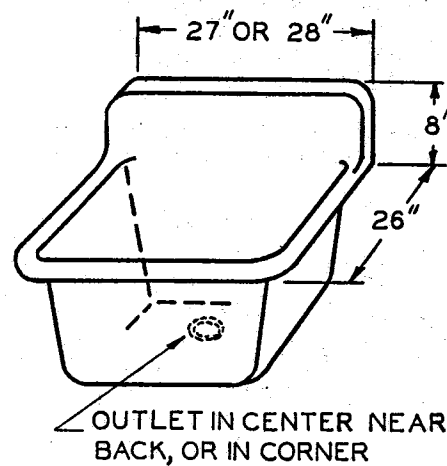


FIGURE 36. Roll-rim laundry trays with back, single compartment. (Par. 4.8.1 (a).)

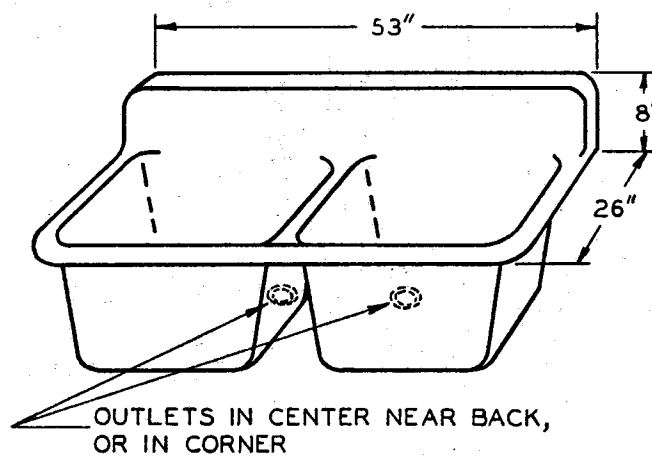


FIGURE 37. Roll-rim laundry trays with back, double compartment. (Par. 4.8.1 (b).)

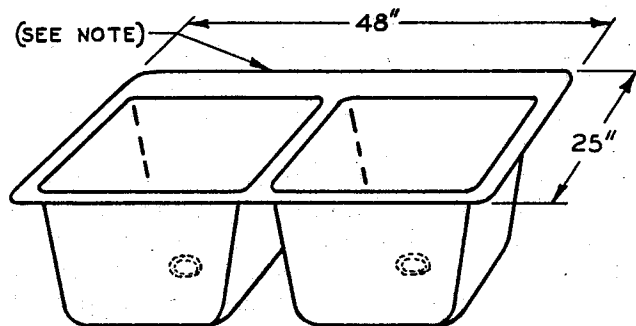


FIGURE 38. *Ledge flat-rim laundry trays, double compartment. (Par. 4.8.2.)*

NOTE.—If ledge is drilled for supply openings, the diameters and spacing are the same as for sink and tray combinations, fig. 32.

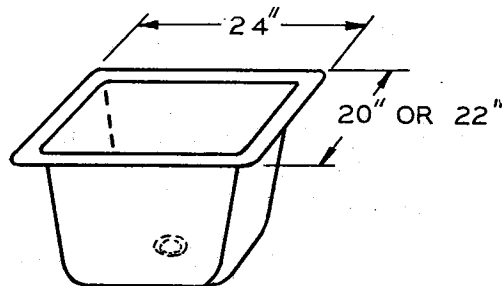


FIGURE 39. *Flat-rim laundry trays. (Par. 4.8.3.)*

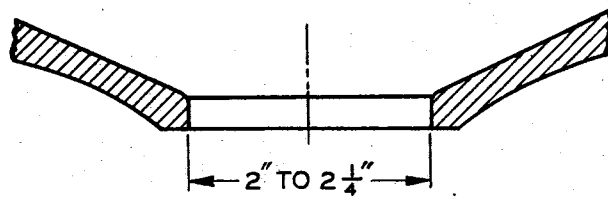


FIGURE 40. *Laundry trays—outlet dimensions. (Par. 4.8.4.)*

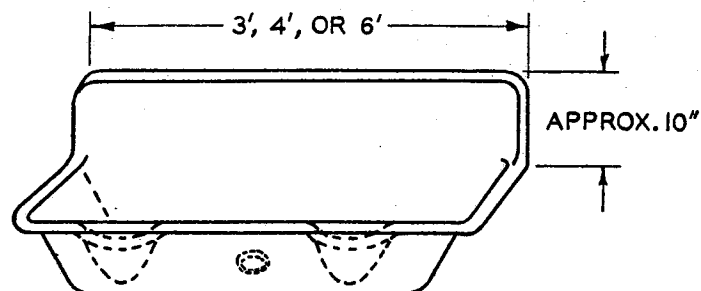


FIGURE 41. *Trough urinals with back. (Par. 4.9.1.)*

## 5. DEFINITIONS

- 5.1 *Enameled cast iron (as applied to plumbing fixtures).*—A product cast from molten iron and coated with enamel fused to the metal. The enamel coating is hard, glossy, and opaque, and, in combination with the solid cast-iron base, produces a rigid, durable product.
- 5.2 *Inspection window.*—A circular opening 3 in. in diameter cut from a small sheet of any flexible material, such as rubber or paper, for convenience in sliding over irregular surfaces to determine segregation. A segregation is a collection of blemishes within the inspection window greater than permitted by table 1.
- 5.3 *Flaws.*  
*Cracked fixture.*—A fixture with a rupture extending through both the casting and enamel.  
*Craze.*—A crack in the enamel surface.  
*Lift.*—An area of metal base from which the enamel has separated.  
*Pinhole.*—A hole which extends through the enamel to the metal base.
- 5.4 *Blemishes.*  
*Dimple.*—A slight depression in the enamel surface.  
*Lump.*—A raised portion of the enamel surface.  
*Specks.*—Particles of foreign matter which produce a colored portion of the surface.  
Small:  $\frac{1}{100}$  to  $\frac{1}{64}$  in. in maximum dimension.  
Medium: Over  $\frac{1}{64}$  to  $\frac{1}{32}$  in. in maximum dimension.  
Large: Over  $\frac{1}{32}$  to  $\frac{1}{16}$  in. in maximum dimension.  
*Waviness.*—The appearance of irregular surface in the glaze. Some waviness in an enamel surface is unavoidable and is not cause for rejection.
- 5.5 *Ledge back.*—A flat ledge at the back of a lavatory, sink, or laundry tray, not more than 2 in. higher than the rim and extending the full length of the fixture, on which the supply fitting can be mounted and small articles placed; or a similar construction with a center panel suitable for mounting a supply fitting.
- 5.6 *Shelf back.*—A flat elevation at the back of a lavatory, higher than 2 in. above the rim and extending the full length of the fixture, on the top or front of which the supply fitting can be mounted and on which small articles can be placed; or a similar construction with a center panel formed into the shelf suitable for mounting a supply fitting on either horizontal or inclined surfaces.

## 6. INSPECTION RULES

6.1 The fixture shall be examined with the eyes of the observer about 2 ft. from the surface observed. The light source shall be partially diffused daylight, supplemented if necessary with diffused artificial light, the total being of intensity approximating that usually available within a few feet of an outside window, but not in direct sunlight. No actual count or measure of blemishes should be attempted except in case of doubt, since with practice dimensional limits and numbers can readily be gaged by the eye. No flaws shall be allowed. Some waviness in an enamel surface is unavoidable and is



TABLE 1. Allowable blemishes

Description	Size or appearance	Maximum number allowed per inspection window	Maximum number allowed per fixture
Specks.....	{ Small.....	4	Not to be counted.
	{ Medium.....	2	8
	{ Large.....	1	5
Dimples.....		2	8
Lumps.....		2	8

not cause for rejection; other blemishes shall be limited to those listed in table 1.

## 7. METHODS OF TEST

7.1 *Test for warpage.*—The fixture shall be placed on a flat surface so as to ascertain the amount of deviation from the horizontal plane that exists at the edges of the fixture. If a feeler gage of thickness equal to the total allowable warpage will not slide under the fixture without forcing, the fixture satisfactorily comes within the warpage limitations. If the fixture will rock on two opposite high corners, the horizontal plane shall be determined by placing one feeler gage of the total warpage allowed under one low corner and holding the fixture firmly on this gage. If a second feeler gage of the same thickness will not slide under the fixture at any other point, the fixture is not warped out of the horizontal plane by more than the specified tolerance, and satisfactorily comes within the warpage limitations.

### 7.2 Tests for acid-resisting enamel.

7.2.1 *Method of test.*—Acid-resisting enamel shall be subjected either to the lemon test or to the citric acid test, as specified below, but in cases of dispute the citric acid test shall be the umpire test. The test for subsurface acid resistance may be made at the option of the purchasing agency or the inspector.

7.2.2 *Lemon test.*—The cut side of a freshly cut half of a normally ripe lemon shall be placed on a cleaned area of the enameled ware, and after 24 hours at room temperature the lemon shall be removed and the surface washed with water and wiped dry. No effect on the enamel shall be visible upon careful inspection.

7.2.3 *Citric acid test (umpire test).*—A fresh test solution made of 1 part citric acid crystals to 10 parts water by weight shall be applied to the surface of the enamel for 15 minutes, at the end of which period, after washing and drying, no effect of the acid on the treated area shall be visible upon careful inspection. The ware and the acid solution shall have been stored for not less than 3 hours immediately preceding the tests in atmosphere at 80° F,  $\pm 10^\circ$  F, and the tests shall be made under these conditions of temperature. The test solution shall be applied to clean areas, in pools consisting of several drops, and covered with a watch glass to hold the solution in place.

7.2.4 *Test for subsurface acid resistance of enamel coatings on cast iron.*—The test is ordinarily made on a flat or nearly flat specimen 2 in. square cut from a fixture.

(1) Grind off the enamel so as to expose a smooth oblique section of the coating and part of the metal base. Specimens cut from the

article may be ground along a cut edge. The oblique section of enamel shall be  $\frac{3}{4}$  in.,  $\pm \frac{1}{8}$  in. (1.6 to 2.2 cm) wide. The abrasive used in grinding shall pass a No. 150 sieve and shall be moistened during grinding.

(2) Restore the gloss to the ground enamel surface by refiring just sufficiently to obtain a fire polish. The polished surface shall permit ready cleaning, with a dry cloth, of marks made by a colored wax pencil.

(3) Apply the citric acid test, as specified in paragraph 7.2.3, to the full width of the fire-polished oblique section. The cut specimens may be immersed in the test solution. After application of the test solution for 15 minutes, the treated surface shall be washed and dried.

(4) The entire oblique section shall be rubbed with a colored wax pencil, and the deposit of colored wax rubbed with a dry cloth. If the wax cannot be readily and evenly removed from all portions of the treated area of enamel by rubbing, thus indicating that the enamel has been roughened by the test solution, the enamel shall not be considered acid resisting throughout.

**7.3 Marking.**—Each fixture shall be marked with the manufacturer's guaranty label or registered trade-mark. All acid-resisting enameled ware shall bear the manufacturer's mark, applied so as to be permanent, signifying acid-resisting material. These marks shall be legible, readily identified, and except for fixtures built into or for a counter or cabinet, the marks shall be located so as to be visible after the fixture is installed.

## 8. LABELING

8.1 In order that the purchaser may be assured that he is obtaining enameled cast-iron plumbing fixtures conforming to this standard, it is recommended that ware complying therewith shall bear a sticker or other label containing the following wording:

This enameled CAST-IRON fixture complies with the requirements and tests of Commercial Standard CS77-56, as developed by the trade under the procedure of the Commodity Standards Division, and issued by the U. S. Department of Commerce.

8.2 The label may be accompanied by the manufacturer's recommendations on handling, setting, and cleaning up.

## 9. EFFECTIVE DATE

9.1 Having been passed through the regular procedure of the Commodity Standards Division, and approved by the acceptors hereinafter listed, this Commercial Standard was issued by the United States Department of Commerce, effective from September 15, 1956.

EDWIN W. ELY,  
*Chief, Commodity Standards Division.*

## HISTORY OF PROJECT

*First edition.*—On March 28, 1939, the National Bureau of Standards was requested by the Sanitary Cast Iron Enameled Ware Association to assist the industry in the establishment of a Commercial Standard for their products. A draft was widely endorsed, but before its completion, further recommendations from producers for enlarge-

ment of the standard were received, and subsequently submitted to the industry for approval. Following acceptance, the establishment of Commercial Standard CS77-40, Sanitary Cast Iron Enameled Ware, was announced on April 25, 1940, as the first printed edition.

*Second edition.*—A recommended revision was submitted by the Enameled Cast Iron Plumbing Fixtures Association under date of May 13, 1946. Upon circulation to the industry on December 29, 1947, following approval by the standing committee, the revision was accepted, and the second edition was announced on April 30, 1948, as CS77-48, Enameled Cast Iron Plumbing Fixtures.

*Third edition.*—Further additions to the standard were recommended by the Enameled Cast Iron Plumbing Fixtures Association on May 15, 1950. With majority approval of the manufacturers and the standing committee, the revision was circulated to the trade on May 10, 1951. Having been accepted, this revision was announced as the third edition, CS77-51, on December 7, 1951.

*Fourth edition.*—Proposals for further revision, to conform with changes in industry practices respecting staple types and sizes of fixtures and improved manufacturing processes, were submitted by the Enameled Cast Iron Plumbing Fixtures Association on December 29, 1954. Upon approval by the standing committee, an adjusted draft (TS-5278) was circulated under date of August 24, 1955, to the trade for acceptance. Sufficient acceptances were subsequently received, and in the absence of valid opposition, the fourth edition, CS77-56, was announced on August 15, 1956.

Project Manager: A. S. Best, Commodity Standards Division, Office of Technical Services.

Technical Adviser: J. C. Richmond, Mineral Products Division, National Bureau of Standards.

### STANDING COMMITTEE

The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comments concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Commodity Standards Division, Office of Technical Services, United States Department of Commerce, which acts as secretary for the committee.

A. G. ZIBELL, Kohler Co., Kohler, Wis. (chairman).

W. O. THOMPSON, American Radiator & Standard Sanitary Corp., New York 18, N. Y.

LOUIS PROBST, Eljer Co., Pittsburgh 22, Pa.

W. P. KLIMENT, Crane Co., Chicago 5, Ill.

JAMES H. PEERY, Central Supply Association, Chicago 1, Ill.

ALFRED E. ELLIS, Sol Ellis & Sons, Inc., Chicago 13, Ill. (representing the National Supply Association of America, Inc.).

G. A. BAEHR, Sears, Roebuck & Co., Chicago 7, Ill. (representing the Mail Order Association of America).

H. E. TIPPETT, Hajoca Corp., Philadelphia 1, Pa.

H. L. STEVENS, Stevens, Inc., Hutchinson, Kans. (representing National Association of Plumbing Contractors).

LEON CHATELAIN, JR., Washington 6, D. C. (representing the American Institute of Architects).

H. W. WEIGERT, Eugene Duklauer, Inc., 215 East 38th St., New York 16, N. Y. (representing National Association of Purchasing Agents).

F. MORGAN BROWN, Western Plumbing Officials Association, Los Angeles 47, Calif.

FRED W. MCGHAN, Federal Housing Administration, Washington 25, D. C.

## ACCEPTANCE OF COMMERCIAL STANDARD

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this Commercial Standard.

Date \_\_\_\_\_

Commodity Standards Division,  
Office of Technical Services,  
U. S. Department of Commerce,  
Washington 25, D. C.

Gentlemen:

We believe that this Commercial Standard constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

production<sup>1</sup>    distribution<sup>1</sup>    purchase<sup>1</sup>    testing<sup>1</sup>

of enameled cast-iron plumbing fixtures. We reserve the right to depart from it as we deem advisable.

We understand, of course, that only those articles which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

Signature of authorized officer \_\_\_\_\_  
(In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer \_\_\_\_\_

Organization \_\_\_\_\_  
(Fill in exactly as it should be listed)

Street address \_\_\_\_\_

City, zone, and State \_\_\_\_\_

<sup>1</sup> Underscore the one that applies. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

## TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial Standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of Commercial Standards is to establish, for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the Commercial Standard where practicable in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of Commercial Standards on a Nation-wide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

## ACCEPTORS

The organizations listed below have individually accepted this standard for use as far as practicable in the production, distribution, testing, or purchase of enameled cast-iron plumbing fixtures. In accepting the standard, they reserved the right to depart from it as they individually deem advisable. It is expected that articles which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

### ASSOCIATIONS

#### (General Support)

American Ceramic Society, Columbus, Ohio  
American Institute of Architects, Washington, D. C.  
American Institute of Wholesale Plumbing & Heating Supply Associations, Inc., Washington, D. C.  
American Specification Institute, Chicago, Ill.  
Central Supply Association, Chicago, Ill.  
Delta Plumbing Contractors Association, Clarksdale, Miss.  
Lead Industries Association, New York, N. Y.  
National Association of Plumbing Contractors, St. Louis, Mo.  
Sanitary Brass Institute, Pittsburgh, Pa.  
Western Plumbing Officials Association, Los Angeles, Calif.

### FIRMS AND OTHER INTERESTS

Adams, Franklin O., Tampa, Fla.  
Aitchison-Richmond Supply Co., St. Joseph, Mo.  
Allied Supply Co., Inc., Lyons, Ill.  
American Radiator & Standard Sanitary Corp., New York, N. Y.  
American Sanitary Manufacturing Co., Abingdon, Ill. (General support.)  
Baltimore & Ohio Railroad Co., Baltimore, Md.  
Bay Hardware, Coos Bay, Oreg.  
Bethlehem Plumbing Supply Co., Bethlehem, Pa.  
Beuth, John P., Plumbing & Heating Contractor, Moberly, Mo.  
Birdsall, W. A., & Co., Linden, N. J.  
Bradley, J. R., Co., Inc., Reno, Nev.  
Braman, Dow & Co., Boston, Mass.  
Brust & Brust, Milwaukee, Wis.  
Camlet, J. Thomas, Passaic, N. J.  
Cannon & Mullen, Salt Lake City, Utah  
Carstens Bros., Ackley, Iowa.  
Case, W. A., & Son Manufacturing Co., Buffalo, N. Y.  
Chandler Co., Cedar Rapids, Iowa  
Cleveland Clinic Foundation, Cleveland, Ohio  
Clompus, I. M., West Chester, Pa.  
Commercial Enameling Co., Los Angeles, Calif.  
Connor Co., Peoria, Ill.  
Conrad & Cummings, Binghamton, N. Y.  
Consolidated Supply Co., Portland, Oreg.  
Conwell, E. L., & Co., Philadelphia, Pa.  
Crane Co., Chicago, Ill.  
Dalziel Plumbing Supplies, San Francisco, Calif.  
Danser Hardware & Supply Co., Weston, W. Va.  
Dearborn Brass Co., Cedar Rapids, Iowa (General support.)

Detroit, City of, Department of Buildings & Safety Engineering, Detroit, Mich.  
Du-Kane Supply Co., Pittsburgh, Pa.  
Duner Co., Chicago, Ill.  
Eljer Co., Pittsburgh, Pa.  
Empire Supply Co., Inc., Visalia, Calif.  
Fall River Steam & Gas Pipe Co., Corp., Fall River, Mass.  
Federal Huber Co., Chicago, Ill.  
Flannagan, Eric G., & Sons, Henderson, N. C.  
Fleck Co., Camden, N. J.  
Florida Automobile & Gas Engine Co., Tampa, Fla.  
Gerber, Max, Inc., Chicago, Ill.  
Gibbons, M. J., Supply Co., Dayton, Ohio  
Glauber, Inc., New York, N. Y.  
Globe Valve Corp., Delphi, Ind.  
Grand Haven Brass Foundry, Grand Haven, Mich.  
Hajoca Corp., Philadelphia, Pa.  
Hall, Howard G., Office of, Baltimore, Md.  
Hanson & Gavin, Virginia, Minn.  
Hendrickson, Mrs. Bert W., Bradenton, Fla.  
Holyoke Supply Co., Holyoke, Mass.  
Hospital Center at Orange, Orange, N. J.  
Hubbard, S. B., Co., Jacksonville, Fla.  
Humphries Manufacturing Co., Mansfield, Ohio  
Huntington Plumbing Supply Co., Inc., Huntington Station, N. Y.  
Illinois Supply Co., Aurora, Ill.  
Industrial Supply Co., Terre Haute, Ind.  
Iowa Methodist Hospital, Des Moines, Iowa  
Jacobson, A. D., Plumbing & Heating Co., Inc., Kansas City, Mo.  
Jardine Plumbing Co., Chillicothe, Ohio  
Johnson, J. D., Co., Pensacola, Fla.  
Johnson Hardware Co., Clarksburg, W. Va.  
Jones & Bindon, Seattle, Wash.  
Kennedy Co., Cleveland, Ohio  
Kinsey, H. P., Co., Easton, Pa.  
Knapp Supply Co., Inc., Muncie, Ind.  
Kohler Co., Kohler, Wis.  
Koller Bros. Co., Cleveland, Ohio  
La Crosse Plumbing Supply Co., La Crosse, Wis.  
Lansing Supply Co., Lansing, Mich.  
Latenser, John, & Sons, Omaha, Nebr.  
Levine, Samuel, New York, N. Y.  
Loeb, Laurence M., White Plains, N. Y.  
Malone Plumbing Supply Co., Pittsburgh, Pa.  
Mann & Co., Hutchinson, Kans.  
May Supply Co., Anderson, Ind.  
McAuliffe & Burke Co., Boston, Mass.  
McGowin-Lyons Hardware & Supply Co., Mobile, Ala.  
McNeill, O. H., Plumbing & Heating Contractor, Herrin, Ill.  
Memphis Plumbing & Heating Supply Co., Memphis, Tenn.  
Michigan Supply Co., Lansing, Mich.  
Miller Supply Co., Chicago, Ill.  
Miller, Vrydagh & Miller, Terre Haute, Ind.  
Milwaukee Faucets, Inc., Milwaukee, Wis.

Mineola Plumbing Supply Co., Inc., Mineola,  
 Long Island, N. Y.  
 Miner Supply Co., Red Bank, N. J.  
 Missouri Pacific Lines, St. Louis, Mo.  
 Moran, Clifford, Plumbing & Heating Serv-  
 ice, Highland Park, Ill.  
 Mott Bros. Co., Rockford, Ill.  
 Mount Zion Hospital, San Francisco, Calif.  
 Murphy Supply Co., Green Bay, Wis.  
 National Plumbing Fixture Corp., Ellwood  
 City, Pa.  
 Ohio Oil Co., Findlay, Ohio  
 Patterson, W. S., Co., Appleton, Wis.  
 Peerless Colorado Co., Denver, Colo.  
 Plumbers & Factory Supplies, Inc., Columbus,  
 Ohio  
 Plumbers Supply Co., Louisville, Ky.  
 Plumbers Supply Co., New Bedford, Mass.  
 Plumbers Supply Co. of St. Louis, St. Louis,  
 Mo.  
 Poekert, R. A., Pittsburgh, Pa.  
 Prier Brass Manufacturing Co., Kansas City,  
 Mo.  
 Proctor Community Hospital, Peoria, Ill.  
 Providence Pipe & Sprinkler Co., Providence,  
 R. I.  
 Reading Co., Philadelphia, Pa.  
 Reed-Cromex Corp., Cleveland, Ohio  
 Resnikoff, Abraham, New York, N. Y.  
 Richmond Radiator Co., Metuchen, N. J.  
 Roberts-Hamilton Co., Minneapolis, Minn.  
 Robischung-Kiesling Contracting Corp.,  
 Houston, Tex.  
 Royal Brass Manufacturing Co., Cleveland,  
 Ohio  
 St. John's Hospital, Tulsa, Okla.  
 Sales, Murray W., & Co., Detroit, Mich.  
 Seaford Plumbing Supply Co., Seaford, Del.  
 Sears, Roebuck & Co., Chicago, Ill.  
 Seashore Supply Co., Atlantic City, N. J.  
 Seattle Plumbing Supply Co., Seattle, Wash.  
 Seekell, H. H., Ypsilanti, Mich.  
 Sherwood Brass Works, Detroit, Mich.  
 Smith, Louis, & Sons, Inc., Chicago, Ill.  
 Southside Plumbing & Heating Maintenance,  
 Freeport, N. Y.  
 Spiegel, Inc., Chicago, Ill.  
 Square Supply Co., Knoxville, Tenn.  
 Staub, Rather & Howze, Houston, Tex.  
 Swan Products Export Corp., Philadelphia,  
 Pa.  
 Sweet's Catalog Service, New York, N. Y.  
 (General support.)  
 Thorne, Henry Calder, Ithaca, N. Y.  
 Trant, Thomas, & Bro., Inc., Hartford, Conn.  
 Treaty Co., Greenville, Ohio  
 Trimble & Lutz Supply Co., Wheeling, W. Va.  
 U. S. Supply Co., Wichita, Kans.  
 Universal-Rundle Corp., New Castle, Pa.  
 Van Denberg Supply Co., Rockford, Ill.  
 Walker Supply Co., Trenton, N. J.  
 Walsh, Louis A., Waterbury, Conn.  
 Weber, C. L., & Co., Inc., Philadelphia, Pa.  
 Weeks, Ralph E., Co., Scranton, Pa.  
 Welch, Carroll E., Huntington, N. Y.  
 Welker Supply Co., Cleveland, Ohio  
 Westchester Square Plumbing Supply Co.,  
 Inc., New York, N. Y.  
 Western Electric Co., New York, N. Y.  
 Wigman Co., Sioux City, Iowa  
 Wisconsin State Board of Health (Division  
 of Plumbing), Madison, Wis.  
 Withey, Henry F., Sherman Oaks, Calif.  
 Wolf, Louis G., Henderson, Ky.  
 Wolverine Brass Works, Grand Rapids, Mich.  
 Woolcock Plumbing & Heating Co., Niagara  
 Falls, N. Y.  
 Worthington, Geo., Co., Cleveland, Ohio  
 Zimmerman & Granger, Los Angeles, Calif.

#### FEDERAL GOVERNMENT AGENCIES

Department of the Army, Procurement Di-  
 vision, Standards Branch, Washington,  
 D. C.  
 Federal Housing Administration, Washing-  
 ton, D. C.  
 Panama Canal Co., Engineering & Construc-  
 tion Bureau, Balboa, Canal Zone.

#### OTHER COMMERCIAL STANDARDS

A list of all effective Commercial Standards may be obtained from the Com-  
 modity Standards Division, Office of Technical Services, U. S. Department of  
 Commerce, Washington 25, D. C. These publications may be purchased at the  
 prices indicated on the list, which also includes directions for ordering copies.